The Weather Nut

A Newsletter from the NWS Office in Wakefield, VA

Inside this issue:

Dual Polarization Radar Technology to Arrive in Early 2012

The two National Weather Service Doppler radars serving central and eastern Virginia, northeast North Carolina and eastern Maryland are scheduled to be enhanced with the latest dual polarization technology in early 2012.

Dual polarization radar technology can better detect heavy rainfall in flooding events, improve hail detection in thunderstorms and improve classification of precipitation types (rain, snow, ice). It can also detect the presence of airborne tornado debris, giving a forecaster a high degree of confidence that a damaging tornado is occurring. This helps a forecaster confirm and track the location of a tornado, which is especially helpful at night when tornadoes are difficult to spot with the human eye.

"This is the most significant upgrade to the nation's weather radar network since Doppler radar was first installed in the early 1990s," said Jack Hayes, director of NOAA's National Weather Service. "Dual polarization technology provides significantly more information and clearer pictures of current weather conditions, helping National Weather Service meteorologists provide more accurate and timely forecasts."

Current National Weather Service radars provide forecasters information on precipitation intensity and movement (direction and speed). Dual polarization technology adds new information about the size and shape of an object, which will improve estimates of how much rain is falling, improving flash flood detection and warnings. During winter weather, dual polarization radar can tell the difference between rain, snow and ice, which gives forecasters a much better idea of what to expect at the ground.

Installation will begin on February 13th, 2012 at the Dover Air Force Base radar site in Delaware and at the Wakefield, Virginia site on February 27th. Installation is expected to take two weeks to complete. During the upgrade, adjacent National Weather Service radars will provide coverage. Installation of dual polarization technology in all 122 National Weather Service radars is expected to be completed in 2013.

—Jonathan McGee

A Message from New Meteorologist in Charge — Jeff Orrock

What is weather worth?

The goal of the Wakefield, Virginia National Weather Service (NWS) office is to provide timely and accurate forecasts, warnings, climate and hydrological services. As the new Meteorologist in Charge, I look forward to taking a leading role in the agency mission. Originally from Richmond, VA and growing up in Tidewater area, I am excited to return to the place where I first gained a passion for weather. My 17 year career in the NWS has taken me from Florida to Texas and North Carolina, providing the opportunity to experience all types of extreme weather, working with extraordinary people.

As we look to the future and ways to improve our services we ask ourselves and our customers, “What is at Risk and the Value of NOAA’s NWS Products?” The NWS is the nation’s first line of defense against severe weather. More and more sectors of the U.S. economy recognize and plan for changing weather, water, and climate conditions emphasizing the need for timely and accurate forecasts and warnings. In 2010 alone, more than 37 percent of flight delays were attributable to weather, accounting for 24.7 million delayed minutes. Delayed flights cost the airlines and customers $1.6 billion. In addition, an estimated $10 billion was lost by industries that rely on air traffic for supplies or customers. Even trucking companies and other commercial vehicle operators lose an estimated 32.6 billion vehicle hours each year due to weather-related congestion. Accurate forecasts and planning can help to mitigate these impacts and loses.


Jeff Orrock

Aside from severe weather, daily routine forecasts are vital to the nation’s economy. As highlighted by researchers from the Societal Impacts Program at the National Center for Atmospheric Research, the Department of Economics at the University of Colorado, Stratus Consulting, Inc., and Energy Analysis Department at the Lawrence Berkeley National Laboratory, routine weather events such as rain and temperature extremes, can add up to an annual economic impact of as much as $485 billon, or about 3.4 percent of the gross domestic product. U.S. electricity producers save $166 million annually using 24-hour temperature forecasts to plan power generation to meet electricity demand. The continued improvement in temperature forecast accuracy is estimated to be about $1.4 million per percentage point per year. For a 1°C improvement in accuracy, the benefit is about $59 million per year.

When it comes to severe weather averages, annual insured losses caused by thunderstorms have increased by 500 percent since 1980. Adding to the recent extreme weather, spring 2011 was one of the deadliest and costliest tornado seasons on record in the country. As of mid-June, the NWS had preliminarily recorded approximately 1,482 tornadoes in 2011. Across Virginia and the Carolinas, tornadoes on April 16th and April 28th changed many lives, but timely and accurate warnings issued by the NWS and relayed by the media and other services saved countless lives.

Sometimes our own activity and planning adds to the projected future losses from major storms. The continued development of areas prone to hurricanes and nor’easters has led to a doubling of coastal losses every 10 years. While not along the east coast, Hurricane Katrina destroyed 350,000 homes, which was more than 12 times the number destroyed by any previous natural disaster in the nation’s history. In Virginia and Maryland, our worst case storm could bring devastation to highly populated and developed areas in Hampton Roads and farther north in Ocean City. Next to hurricanes, winter storms highly impact our region. The 5-year running average for U.S. winter storm losses from 2006-2010 was almost $1.7 billion per year.

While no one can stop weather and disasters from coming, they are predictable and with the right tools, planning, forecasts and decisions, the loss of life and damage to property can be greatly reduced. As the Meteorologist in Charge, I look forward to ensuring our forecasts and warning services are the best possible. **—Jeff Orrock**

Aviation News

Weather Safety Seminar

WFO Wakefield participated in the 14th annual Virginia Festival of Flight Fly-In at the Suffolk Virginia (SFQ) Airport on April 30th, 2011. Lead forecaster Mike Rusnak staffed the NWS booth at this aviation expo with nearly 200 planes in attendance. Several builders of private planes and numerous weather enthusiasts stopped by the booth, providing numerous compliments regarding NWS Wakefield's products and services. Information on the NWS's aviation program as well as a listing of aviation web sites was available. Hurricane tracking charts and severe weather brochures were popular items, especially with the school teachers.

Mike also provided daily weather forum presentations titled "The Making of NWS Aviation Forecasts." This presentation satisfied a training requirement for the Virginia Aviation Ambassador Program.

2011 Aviation Career Day

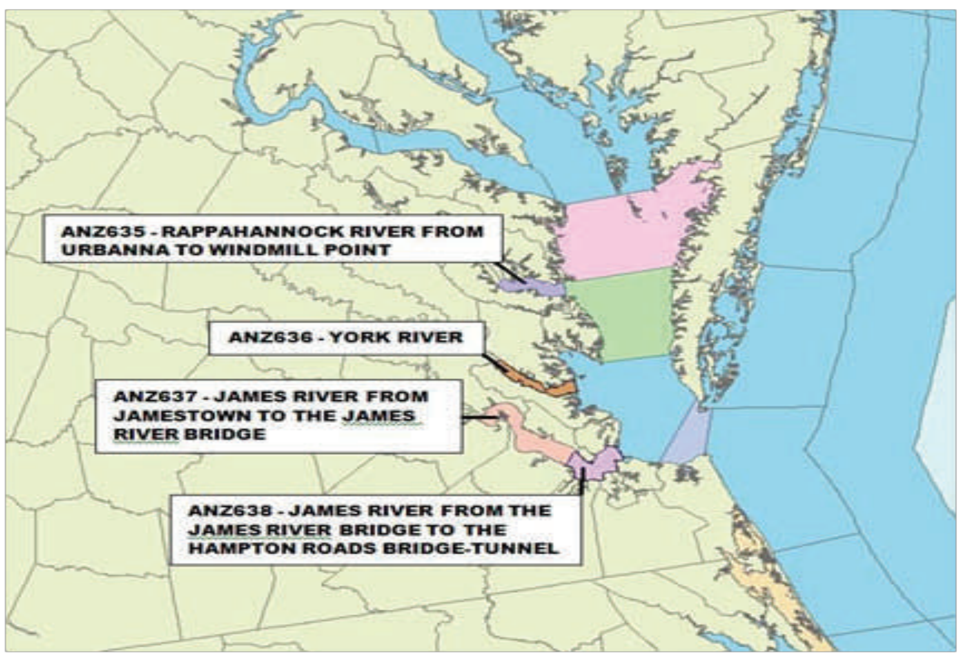
NWS Wakefield will be participating in the 26th annual Rotary Aviation Career Day at the Richmond International Airport on October 27th, 2011. Lead forecaster Mike Rusnak will staff the NWS booth at this event, which includes aviation presentations, a facility and operations tour, aircraft static displays and aviation equipment. Mike will meet with over 200 aviation-oriented high school students and counselors from thirty area high schools. The goal is to assist these students in choosing an aviation career (including the NWS), and to provide the counselors with information which will be helpful in aviation career counseling. Information on the NWS's aviation program as well as a listing of aviation and other weather related web sites will be available to the students. Mike will also answer questions concerning tropical weather and academic requirements for meteorologists.

—Mike Rusnak

Upcoming Marine Zones Changes

Beginning in April 2012, the NWS Wakefield marine area will grow to include large portions of eastern Virginia Rivers. These areas all feature plenty of boat traffic, and often markedly different conditions from the adjacent Chesapeake Bay.

Presently, our southernmost Chesapeake Bay zone, ANZ632, extends from New Point Comfort to the mouth of the Chesapeake Bay. The marine zone change will split ANZ632 into two sections. Areas east of the Hampton Roads Bridge-Tunnel will be unchanged. Areas west of the Hampton Roads Bridge-Tunnel will be incorporated into a new zone, ANZ638, which will extend northwest to the James River Bridge. An additional zone, ANZ637, will be made to cover a portion of the James River west of the James River Bridge, extending west to Jamestown. Additional zones for the York (ANZ636) and Rappahannock (ANZ635) Rivers will also be added.



If you have any feedback regarding these marine zone changes or any part of the marine forecast, please feel free to email our Marine Focal Point at:

Michael.Montefusco@noaa.gov.

Staff News

- **Matt Scalora** was promoted to a General Forecaster here at NWS Wakefield in May. His passion for weather started at a young age growing up in Connecticut. Matt graduated from Fairfield University with a bachelor's degree in mathematics in 2007, then he earned his master's degree in atmospheric science at SUNY-Albany in summer 2009. His thesis was entitled "Distribution of Warm-Season Precipitation Associated with 500-hPa Cutoff Cyclones". While in school, Matt held jobs as a graduate level research assistant, teaching assistant, tutor, and T.V. meteorology intern. Matt entered the NWS in November 2009 as a Met-Intern in Upton, NY. He is excited to be a part of the forecaster team at the Wakefield WFO.

- **Bridget De Rosa** was promoted to a General Forecaster here at NWS Wakefield in June. Bridget, originally from the Midwest, holds a B.S. degree in Geography from Western Michigan University, and another B.S. degree in Atmospheric, Ocean and Space Science from the University of Michigan. Her career as a meteorologist began in August 2005 as a weather observer at the Flint and Lansing airports in Michigan. In February 2007, Bridget was hired as a Met-Intern with the NWS in Missoula, MT. Now in Wakefield, Bridget welcomes the new forecasting challenges that include marine weather, tropical systems and Nor'easters to name a few. In her spare time, Bridget enjoys playing softball, running, and photographing nature.

Welcome Matt and Bridget to the Wakefield Team!

Winter Safety

While the mid-Atlantic region does not experience the kinds of winters that one may experience in the northern-most areas of the country, the recent past has proven that lady winter can still pack a powerful punch. Like hurricane season, we can still use the old saying, "Hope for the best, but prepare for the worst." Here are some winter weather safety tips to consider and keep in mind:

<u>Items to Have on Hand at Home and Work</u>

Flash lights and extra batteries
Extra food and water, including for pets
Extra baby items
Medicines and first aid supplies
Battery powered radio/NOAA weather radio
Emergency heat source
Fire extinguishers

<u>Items You Should Keep in Your Vehicle</u>

Mobile phone and charger
Blankets/sleeping bags
Flashlight with extra batteries
First-aid kit
Extra clothing
Shovel
Windshield scraper and brush
Tool kit
Tow rope
Battery booster cables
Water container
Compass and road maps
High-calorie, non-perishable food

<u>For Farms and Animals</u>

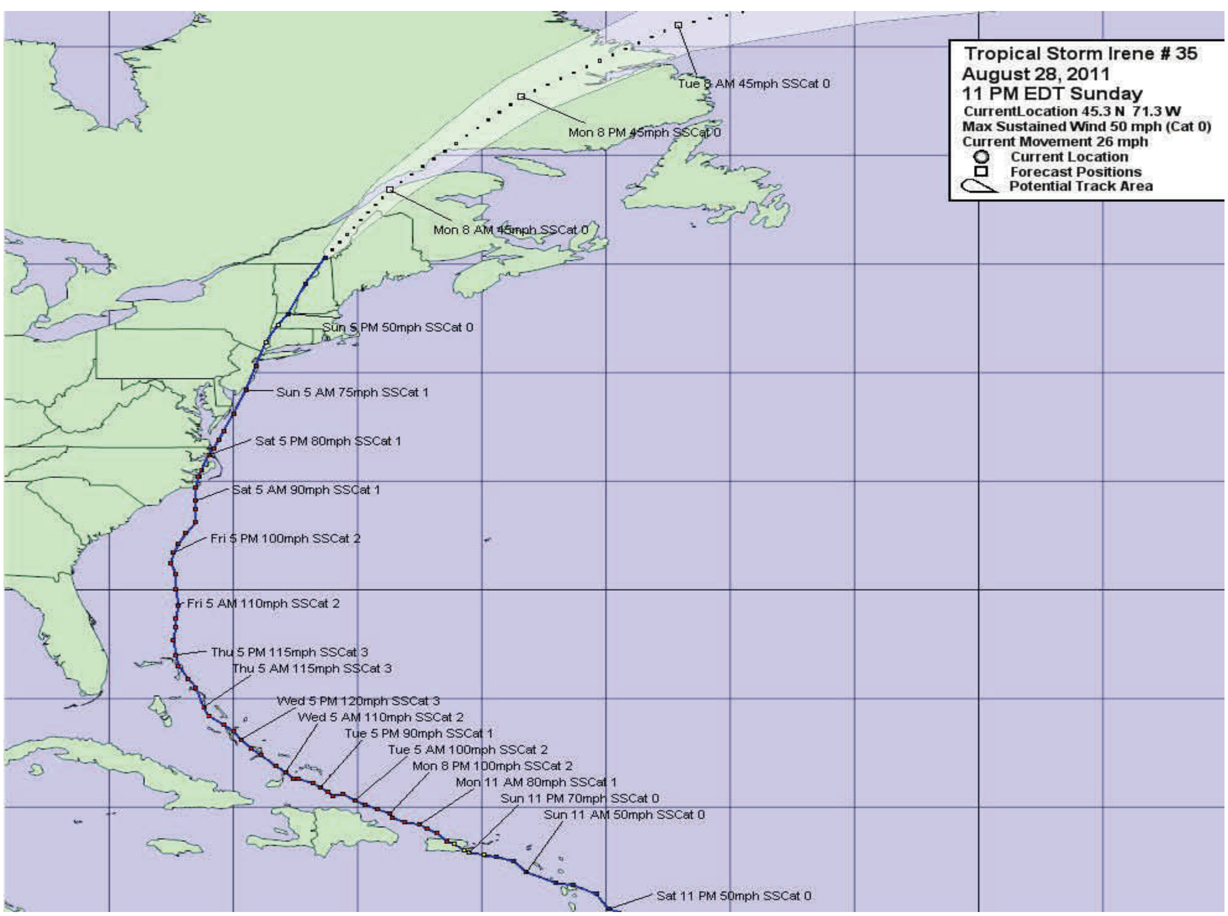
Move animals to sheltered areas
Haul extra feed to nearby feeding areas
Have water available; most animals die from dehydration in winter storms
Make sure pets have plenty of food, water and shelter

Hurricane Irene Summary

Hurricane Irene was the strongest hurricane to impact the Hampton Roads area since Hurricane Isabel in 2003. It moved across the NWS Wakefield's county warning area (CWA) and coastal waters as a minimal category 1 storm with maximum sustained winds of 80 mph. Hurricane warnings were issued all along the coastal waters of VA/NC and much of the DELMARVA. Five deaths occurred in the local area; four related to fallen trees and one due to high surf. The high winds led to widespread power outages, with some residents without power for more than a week.

Hurricane Irene made landfall near Cape Lookout, NC around 8 am Saturday, August 27th. The center of circulation moved north across the Albemarle Sound and entered the Wakefield CWA near Elizabeth City around 5 pm. The storm exited the coast just north of Duck, NC around 7 pm, and then passed just offshore of Sandbridge and Virginia Beach. Irene was offshore of Chincoteague, VA by midnight August 28th and near Ocean City, MD around 3 am.

During the storm, a total of 13 staff members were at the office working and taking shelter. The main forecast issues were the storm surge heights over the lower Bay and Eastern Shore, timing and duration of highest wind speeds/gusts, and locating the westward extent of the heavy rainfall on the back side of the storm. Two tornadoes in VA, one near Sandbridge Beach and the other in Chincoteague, led to localized property damage. As expected, the heaviest rain fell along and east of Irene's track with a swath of 6-12 inches occurring just west of track. Flood Watches were extended well inland to I-95 to account for heavy inland rains. 50-75% of normal rainfall was observed from January–July on average across the region, which allowed for less flooding from Irene's rainfall than is usually expected. The rain also fell over a long period of time and no extreme rainfall rates were observed. Although a few rivers made it to flood stage, river levels were generally low prior to Irene, meaning flooding for the storm would be mainly confined to quick-to-respond tributaries, flood prone, and low lying areas. **—Matt Scalora**



Lateral West Wildfire

Many folks may remember seeing or smelling smoke at various times during the late summer. What exactly caused all of the smoke you may ask? Well, the answer is the Lateral West Fire in the Great Dismal Swamp National Wildlife Refuge in southeast Virginia. The fire was first reported to refuge officials on August 4th, 2011, and is believed to have been started by a lightning strike. The fire, aided by several days of hot weather, quickly spread to over 2,000 acres on August 8th and expanded to approximately 6,300 acres by August 10th. Hundreds of wildland fire fighters along with scores of heavy equipment were quickly dispatched to the fire to help contain it. Thanks to the efforts of firefighters from various state and federal agencies, working for weeks on end, the fire was able to be contained at 6,377 acres (some of which actually burned into northeast North Carolina).

IMET Scott Kennedy inflates a weather balloon at the Lateral West Fire.

The National Weather Service in Wakefield began issuing Spot Weather Forecasts for fire officials at the Lateral West Fire on August 5th, 2011. These detailed, site-specific weather forecasts gave fire officials important details regarding expected temperatures, wind speed and direction, relative humidity, and probability of precipitation. Spot forecasts were crucial to fire officials at the site who used them to create a daily action plan for fighting and containing the wildfire. By August 8th, it was determined that fire officials would need on-site, around the clock weather support from the National Weather Service due to the rapid growth of the fire. Meteorologist Scott Kennedy, a certified Incident Meteorologist (IMET) from NWS Morehead City, North Carolina, arrived at the Lateral West Fire on August 10th. Scott provided weather alerts and forecasts at the fire site from August 10th to August 24th. Scott was relieved by a second IMET from NWS Knoxville, Tennessee, Mark Pellerito, who was on-site until Hurricane Irene hit August 27th.

Despite recent heavy rains, including 10-15 inches from Hurricane Irene, the Lateral West Fire was still burning in early October. However, the active fire had been reduced to only two slightly elevated areas of smoldering peat. Both of the smoldering areas were surrounded by floodwater from an accumulation of rain and a large scale water pumping operation inside the swamp to eliminate the chance of further expansion. Unfortunately, there's no time table as to when the fire will be completely extinguished because of the slow-burning peat that keeps the fire primarily burning underground. **—Jonathan McGee**

NWS Wakefield SKYWARN Spotter Program

SKYWARN is a network of volunteer weather spotters who provide the NWS with real time severe weather reports, and other timely weather information. Each spring and fall, the staff of NWS Wakefield brings the SKYWARN program out into the community, by teaching the general public how to identify and then report severe weather to the NWS. Once again, the class schedule for the fall is filling up fast, and both Basic and Advanced SKYWARN classes have been scheduled across the Wakefield County Warning area. To find a class near you, check out the SKYWARN Schedule page on our website. As a reminder, in addition to welcoming all newcomers to the SKYWARN program, we'd like to remind our existing spotters that they need to attend a training session at least once every three (3) years. This will allow our spotters to remain current on the latest storm spotting techniques and the latest information.

SKYWARN

—Mike Montefusco

2011 Summer in Review

The summer of 2011 went down in the record books as one of the hottest on record across the Wakefield Forecast area. Specifically, it was the 2nd warmest on record at both Richmond and Norfolk set just last year at both locations. Precipitation ended above normal across most of the area, partly due to rainfall from Hurricane Irene. Norfolk had its 4th wettest summer on record.

The summer of 2011 also brought much above normal temperatures across most of the southern and eastern United States as a dome of high pressure in the high altitudes persisted for most of the season.

Temperatures

The summer of 2010 was remembered for its record number of 90 degree days (and 100 degree days at Richmond). This past summer of 2011 was noted for its high dew points. These readings were often above 70 degrees and the combination of high temperatures and humidity verified excessive heat warnings over most of the area from the 21st to the 23rd of July (heat indices of at least 110). This did not occur in 2010. At Norfolk, a string of 37 days with minimum temperatures of 70 degrees or higher ended on August 22nd. This was the 3rd longest streak since records began in 1874; the longest was in 1994 when the temperature remained at 70 degrees or higher for 55 days.

This past summer saw temperatures of 100 degrees and higher 3 times at Richmond and 2 times at Norfolk, all occurring in July. The highest temperature at both Norfolk and Salisbury was 103 on July 23rd. The annual high for Richmond was 103 on July 29th. The high at Wallops Island was 100 on the 22nd and Elizabeth City had a 101 degree reading on the 29th.

Richmond saw its first ever low temperature of 80 and above since records began on July 12th when the low was 81 degrees. A minimum temperature of 82 at Norfolk on July 22nd tied with 2 other events for the 2nd warmest minimum. The record high minimum there was 84 in 1942. A low of 82 at Salisbury on the 23rd of July was an all time record high minimum as was an 83 degree reading at Wallops Island on the same date.

Temperatures generally averaged 2 to 3 degrees above normal. July was the warmest month across the area when maximum temperatures averaged over 90 degrees and most average minimums were over 70.

Precipitation

Unlike 2010, which was drier than normal, wet conditions prevailed during most of the 2011 summer. Although some areas were considered abnormally dry at the beginning of the summer, moisture conditions improved with time. Hurricane Irene in late August put an end to any drought conditions.

Norfolk's summer precipitation totaled 26.31 inches which was more than 11 inches above normal. The wettest summer on record there was 29.74 inches in 1922.

Rainfall during June was near normal for most of the area except well below normal in some areas near the coast such as Salisbury (1.19) and Elizabeth City (0.79).

Heavy localized thunderstorms brought abundant rainfall to much of the area during July. Southeast Virginia saw the heaviest precipitation with almost 11 inches at Norfolk (10.89), more than 9 and a half inches at Patrick Henry Field in Newport News (9.58) and seven and a half inches at Wakefield (7.51). The most widespread precipitation in the Norfolk area fell from the 23rd to the 25th of July when almost 6 inches fell at the airport. Over four inches of rain fell at Newport News on the 8th of July.

The eastern shore of Maryland and Virginia and parts of northeast North Carolina did not share in the heavy rainfall in July with less than 3 inches at Wallops Island (2.83), less than 4 inches at Salisbury (3.77) and four and a half inches at Elizabeth City (4.50).

Scattered precipitation continued into August but prior to Irene, it was not particularly noteworthy.

2011 Summer in Review (continued)

Hurricane Irene brought heavy rainfall to the entire area (August 27th) which averaged 6 to 10 inches east of Interstate 95 with higher amounts (10 to 14 inches) over Gates, Northampton and Bertie Counties of North Carolina as well as adjacent areas of Virginia. Less rain (under 6 inches) fell near the North Carolina coast and on the Virginia eastern shore. Areas near Richmond and west of Interstate 95 toward the Piedmont had between 2 and 5 inches.

The following are averages and totals for temperature and precipitation for our three primary climate sites. Departures are indicated from the 1981 to 2010 30 year normal: —Lyle Alexander

Richmond, VA 2011 Summer Data

	TEMPERATURE				*PRECIPITATION*				*Significance/Remarks*	
	ACTUAL				Total (in)		# Days		Temperature	Precipitation
	Max	Min	Avg	Dep	Actual	Dep	0.01	Dep		
Jun	88.9	67.2	78.1	2.8	3.03	-0.90	9	-1	7th warmest	
Jul	92.8	71.1	82.0	2.7	3.63	-0.88	9	-2	4th warmest	
Aug	89.5	68.4	79.0	1.5	7.10	2.44	11	2		
SUMMER	90.4	68.9	79.7	2.3	13.76	0.66	29	-1	2nd warmest	

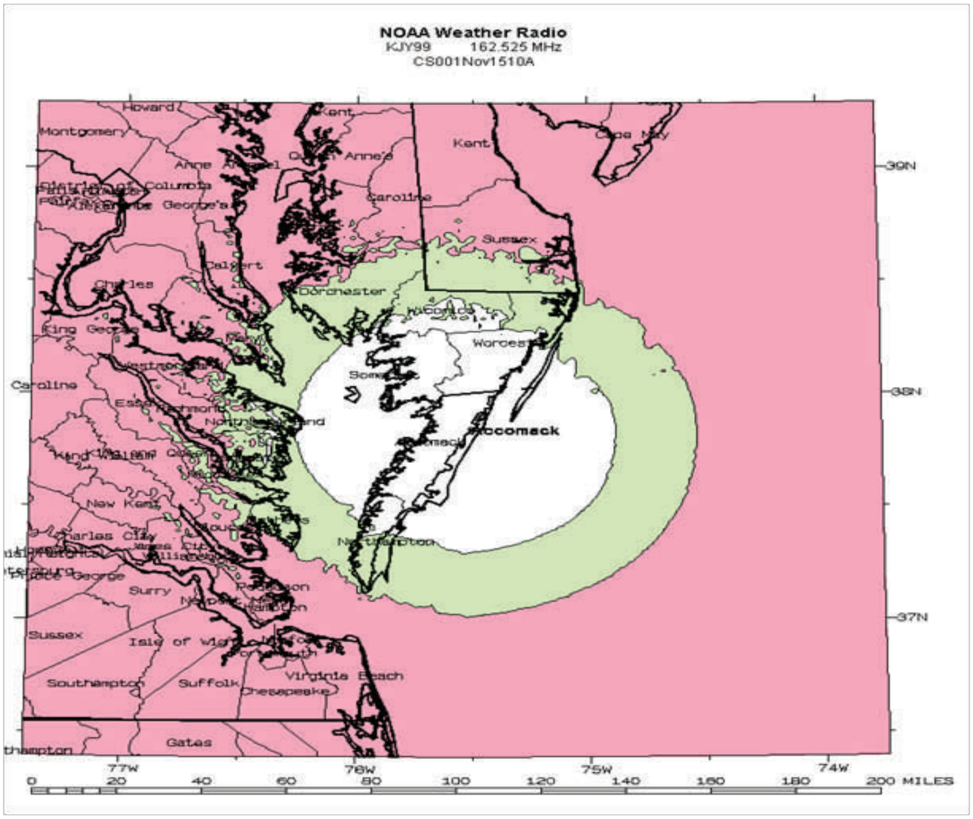
Norfolk, VA 2011 Summer Data

	TEMPERATURE				PRECIPITATION				Significance/Remarks	
	ACTUAL			Dep	Total (in)		# Days		Temperature	Precipitation
	Max	Min	Avg		Actual	Dep	0.01	Dep		
Jun	87.2	70.4	78.8	3.5	4.63	0.37	10	0	6th warmest	
Jul	90.8	73.7	82.3	2.6	10.89	5.75	10	-1	9th warmest	9th wettest
Aug	87.0	72.9	80.0	2.1	10.79	5.27	11	1		9th wettest
SUMMER	88.3	72.3	80.3	2.6	26.31	11.39	31	0	2nd warmest	4th wettest

Salisbury, MD 2011 Summer Data

	TEMPERATURE				PRECIPITATION				Significance/Remarks	
	ACTUAL			Dep	Total (in)		# Days		Temperature	Precipitation
	Max	Min	Avg		Actual	Dep	0.01	Dep		
Jun	87.8	64.1	76.0	3.8	1.19	-2.38	14	4	top 10 records	
Jul	92.5	70.4	81.5	4.2	3.79	0.75	10	-1	not available	
Aug	87.0	66.7	76.9	1.4	11.79	6.80	14	5		
SUMMER	89.1	67.1	78.1	3.1	16.77	-3.67	38	8		

Accomack Transmitter Now Servicing the Eastern Shore



Since January 2011, a new 1000 watt NOAA Weather Radio transmitter, KJY99, operating on a frequency of 162.525 mhz, has been servicing southern portions of the DELMARVA peninsula. The new transmitter is located in Mappsville, Va, and, in addition to Accomack and Northampton counties, also covers portions of Somerset and Worcester counties in Maryland. The transmitter was purchased by the Virginia Department of Emergency Management through federal grants. The transmitter fills a coverage void for mariners on both the Chesapeake Bay and the Atlantic coastal waters. Below is a coverage map for the transmitter. Areas in white have the strongest signals.

—James E. Foster

Cooperative Observer Corner

Paperless Push

To save money and to streamline operations, the National Weather Service is making a push to eventually receive all observations by electronic means. Presently, most of our observers input their observations via WxCoder, a computer-based program, or through IV-ROCS, a touch tone telephone system. Some observers call us with their information and/or mail in monthly B-91 forms. Ultimately the goal is have all observations be entered through WxCoder or IV-ROCS. The NWS realizes that some people prefer not to change the way they provide their observations and we certainly will not force you to change if you do not want to. But, if you are willing to try another way, we encourage you to let us know. Please contact our Observation Program Leader Rick Curry for more information.

—James E. Foster and Rick Curry

Cooperative Observer Corner (continued)

Procedures for Snow Measurements

2011 has been a busy year and it's almost hard to believe that winter is not too far around the corner. Thanks to all our dedicated COOP observers who continue to give their time and efforts to provide us weather data. Your efforts not only help us to do our jobs better, but you provide an invaluable service to the nation's climatological database, which ultimately helps us in our goal to protect life and property and enhance the national economy.

Winter weather brings its own unique challenges and proper reporting of winter elements can sometimes be confusing and difficult. Here are some things to prepare for and remember before that first winter weather event hits us.

Check early to be sure you have snow boards and measuring sticks and that they are in good repair. However, a regular household ruler will do just fine. If you need measuring sticks or boards, notify Rick Curry or James Foster at the Wakefield office and we can make sure you get them.

Have a way to easily find your snow board should it become completely covered by snow. One suggestion is to put a long and sturdy stick into the ground next to the board with a flag or reflector attached. That way you can find it without problem in a deep snow.

Before any snowfall, remember to remove the inner tube from your rain gage. Observers should determine and record three values when reporting solid precipitation, *snowfall, snow depth and water equivalent*.

Snowfall – Measure the snowfall (snow, sleet, or snow pellets) since the last snowfall observation. Report in whole and tenths of an inch. Example: 5.3. Enter the amount in the *snow/ice pellet* column of the B-91 form or in Wxcoder.

Snow depth – Measure the total snow depth on exposed ground at the scheduled time of observation. Take several readings at representative areas near the normal point of observation and use the average.

When using a measuring stick, be sure to push vertically into the snow until the stick touches ground. Be careful not to rest on ice.

Report to the nearest whole inch. Examples: 5.4 inches report as 5; 5.5 inches report as 6; 0.5 inches report as 1; 0.4 inches or less report as T (trace). Enter the amount in the *snow/ice pellet on ground* column on the B-91 or Wxcoder.

Water equivalent – This is the one element that people most often forget to do. Measure the water equivalent of snowfall since the previous day's observation. The easiest way to do this is by bringing the rain gage catch inside and using a measured amount of warm water to melt. Pour this into your inner tube and measure. Be sure to subtract the amount of warm water you used. Enter the difference in whole and hundredths of an inch in the *rain, melted snow, etc*. column on the B-91form or in Wxcoder.

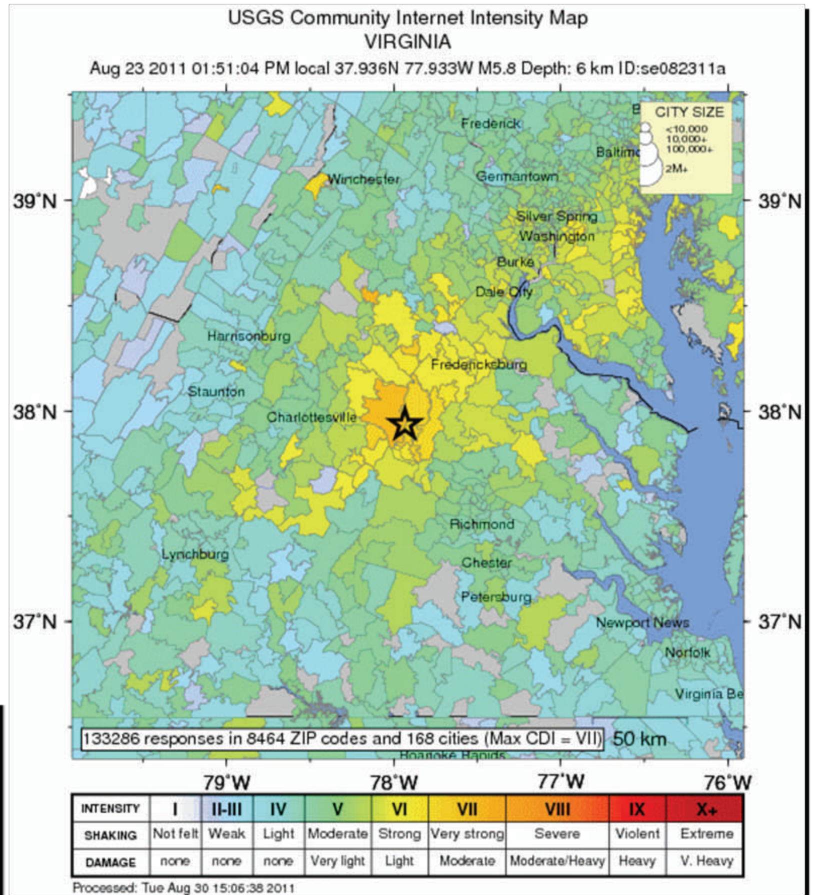
If the wind causes an unrepresentative catch in your gage, take a core sample from your snow board or representative area by using the 8 inch rain gage to cut a "biscuit" of snow into the can. Melt the biscuit with warm water, measure, and subtract the amount of water used.

If you have any questions, please don't hesitate to contact us at the Wakefield NWS office.

—James E. Foster and Rick Curry

Severe Weather, Hurricanes and…Earthquakes??

It was your typical hot and sunny summer afternoon in late August across the mid-Atlantic region. While we were all preparing for Hurricane Irene's arrival during the upcoming weekend, the last thing anyone expected was an earthquake. Yet, that's exactly what happened. At 1:51 pm on Tuesday, August 23rd, a strong earthquake occurred over the eastern Virginia Piedmont, with a depth of 3.7 miles at the epicenter which was 5 miles (8.0 km) south-southwest of Mineral in Louisa County. The magnitude at the epicenter was 5.8 on the Richter scale, with a maximum perceived intensity of 7 (very strong) on a 12-point Modified Mercalli or MM seismic intensity scale. The earthquake occurred as a reverse faulting mechanism on a north or northeast-striking plane within a previously recognized seismic zone, the "Central Virginia Seismic Zone." Specifically, this earthquake's epicenter and most of the aftershocks lie between the Spotsylvania and Chopawamsic Faults. The quake was felt across more than a dozen U.S. states and in several Canadian provinces.



SIGNIFICANT SEISMIC EVENTS 1774-2004
VIRGINIA AND VICINITY

YR	MO	DY	LAT(°N)	LON(°W)	MAG
1774	2	21	37.2	77.4	4.5
1776			39.6	81.9	4.0
1824	7	15	39.7	80.5	4.1
1828	3	10	37.0	80.0	4.6
1833	8	27	37.7	78.0	4.5
1844	11	28	36.0	84.0	4.2
1852	4	29	36.6	81.6	4.8
1852	11	2	37.6	78.6	4.3
1853	5	2	38.5	79.5	4.6
1861	8	31	36.1	81.1	5.0
1875	12	23	37.8	78.0	4.8
1885	10	10	37.7	78.8	4.4
1889	3	8	40.0	76.6	4.1
1897	5	3	37.1	80.7	4.3FS
1897	5	31	37.3	80.7	5.6
1898	2	5	37.0	81.0	4.4
1898	11	25	37.0	81.0	4.5
1899	2	13	37.0	81.0	4.5
1901	5	17	38.75	83.00	4.2
1907	2	11	37.70	78.30	4.0
1913	3	28	36.20	83.70	4.1
1918	4	10	38.70	78.40	4.6
1924	11	13	36.60	82.20	4.0
1928	11	3	36.112	82.828	4.5
1944	1	8	39.800	75.500	4.2
1952	6	20	39.640	82.023	4.0
1954	1	2	36.600	83.700	4.3
1956	9	7	36.445	83.787	4.1
1957	1	25	36.600	83.700	4.0
1966	5	31	37.660	78.130	4.3
1969	7	13	36.120	83.890	4.1
1969	11	20	37.449	80.932	4.6
1975	2	16	39.050	82.422	4.4
1976	1	19	36.866	83.861	4.0
1976	6	19	37.362	81.624	4.7
1976	9	13	36.624	80.768	4.3
1980	7	27	38.193	83.891	5.2
1984	4	23	39.921	76.355	4.1
1984	8	17	37.868	78.324	4.2
1988	4	14	37.238	81.987	4.1
1988	9	7	38.142	83.834	4.6
1989	4	10	37.136	82.068	4.3ME
1990	8	17	36.934	83.384	4.0
1995	10	26	37.053	83.121	4.0ME
1996	6	29	37.187	81.950	4.1
2003	12	9	37.774	78.100	4.5

FS: Foreshock
ME: Mine event

No deaths and only minor injuries were reported; however, minor to moderate damage to buildings was widespread, especially from the epicenter northeast to the Washington DC metropolitan region. The damage was estimated by one risk-modeling firm at $200 million to $300 million, of which about $100 million was insured. The earthquake produced at least 3 or 4 significant cracks in the Washington Monument, while also causing several million dollars worth of damage to the Washington National Cathedral.
Several aftershocks occurred after the main tremor, including a 3.9 magnitude quake centered around 4 miles south-southeast of Mineral on August 25th at 1:07 am EDT.

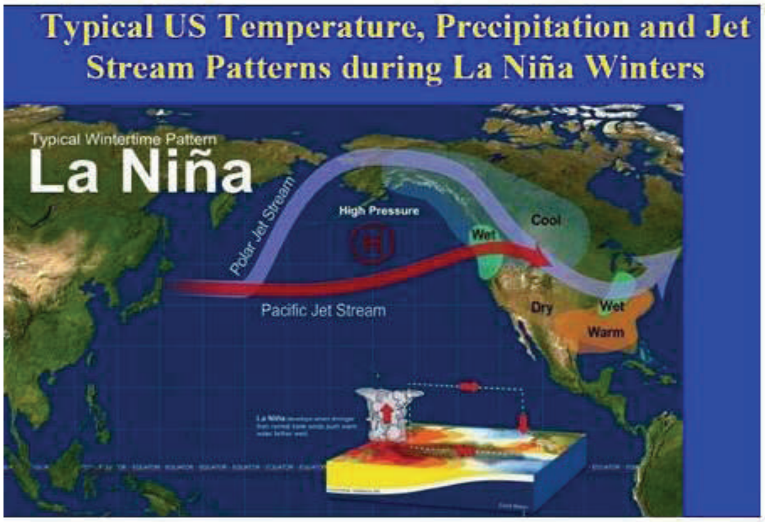
Numerous small and moderate earthquakes have occurred on the Central Virginia Seismic Zone since the 18th century (see table). However, this was the strongest earthquake in recorded history in Virginia, and the strongest since the 5.6 magnitude quake occurred in Giles County on May 31st, 1897. In addition, the Mineral quake, along with the 5.8 magnitude quake on the New York-Ontario border in 1944, are the largest to have occurred in the United States east of the Rocky Mountains since the 18th century.

—Brian Hurley, Mike Rusnak and Bill Sammler

Winter Climatology and 2011-2012 Preliminary Outlook

Local Outlook:

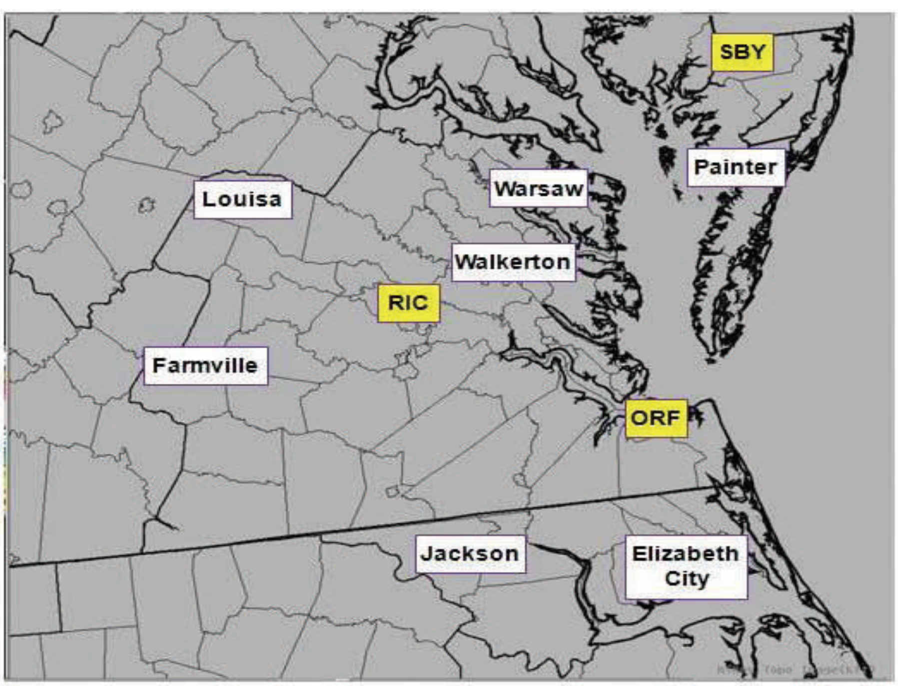
While the Official NOAA Winter Outlook has not yet been issued by the Climate Prediction Center (CPC), all signs indicate a high likelihood of La Nina conditions strengthening and prevailing through the upcoming winter season (source: CPC). While several other factors will ultimately affect the type of winter we experience, the La Nina conditions, taken by themselves, do tend to skew the winter climatology slightly in favor of a warmer and drier than average winter across the southeast and mid Atlantic states (see the image to the left). However, the questions that remain are: how much? and to what extent? As the following graphics will show, the phase of the North Atlantic Oscillation (NAO) that sets up may actually have a more dominant influence on both temperature and snowfall across the region than the ENSO conditions. The problem is that unlike ENSO, the phase of the NAO varies on much shorter timescales and is generally only predictable a few weeks in advance.



Source: Climate Prediction Center

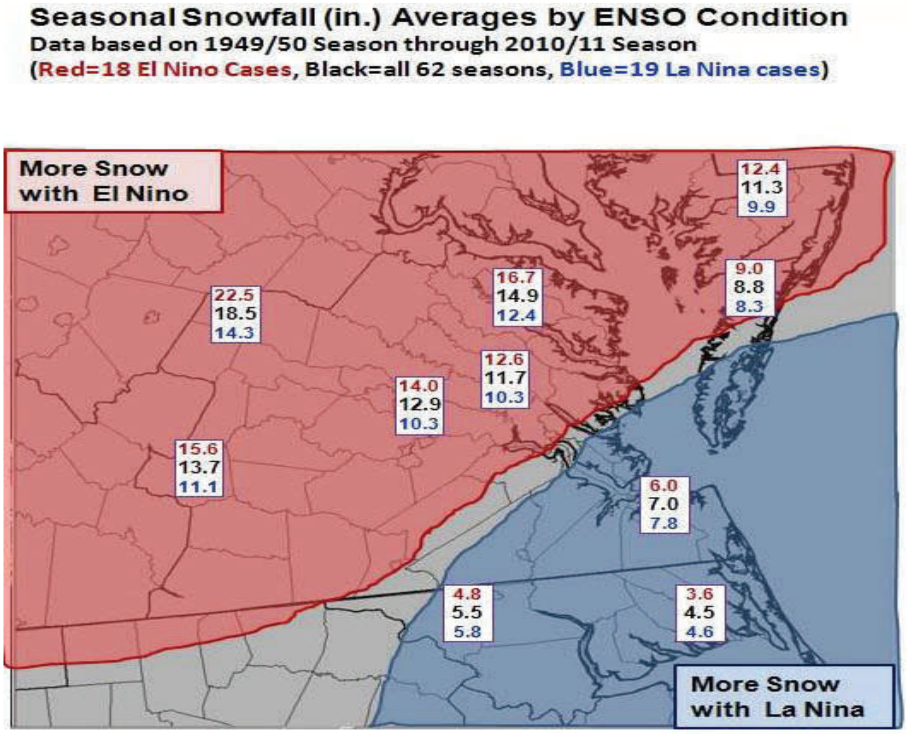
Stations used in the analysis:

Data based on 1949/50 Season through 2010/11 Season
(Yellow indicates 1st order climate stations, the others are from the co-operative network).



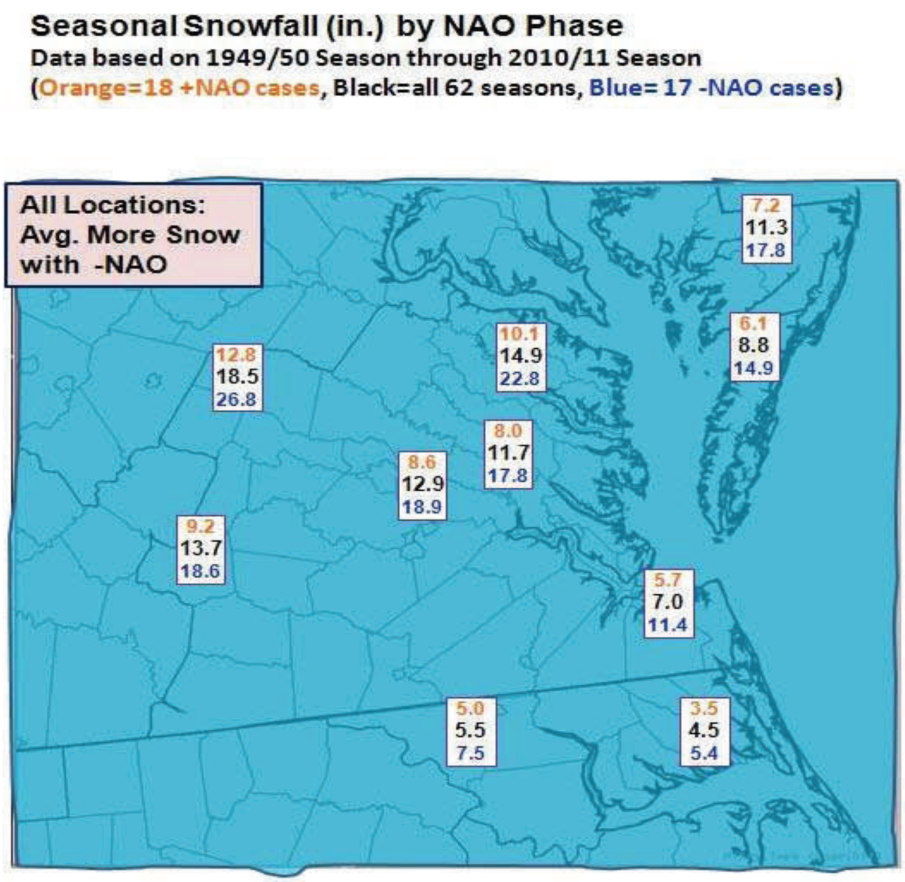
A local study has been performed using several sites across the Wakefield County Warning Area (CWA). Sites were selected based mainly on data availability; favoring those with a complete or near-complete record back through the 1949/50 winter season. This date represents the period through which CPC-calculated indices for ENSO phase and the North Atlantic Oscillation (NAO) are available. For a more detailed discussion on ENSO and/or the NAO see cpc.ncep.noaa.gov.

Winter Climatology and 2011-2012 Preliminary Outlook (cont.)



The image to the left depicts the average snowfall (in inches) for the various sites used in this study. At each site, the top number (red) represents the average snowfall during ENSO positive conditions (El Nino). From the CPC data averaged over a 5-month period (Nov-Mar) we have identified 18 seasons since 1949/50 that were El Nino episodes. Similarly, there have been 19 La Nina seasons identified since 1949/50 and this value is represented by the blue number at the bottom for each site. The black number in the middle represents the average snowfall for all seasons (62) since 1949/50.

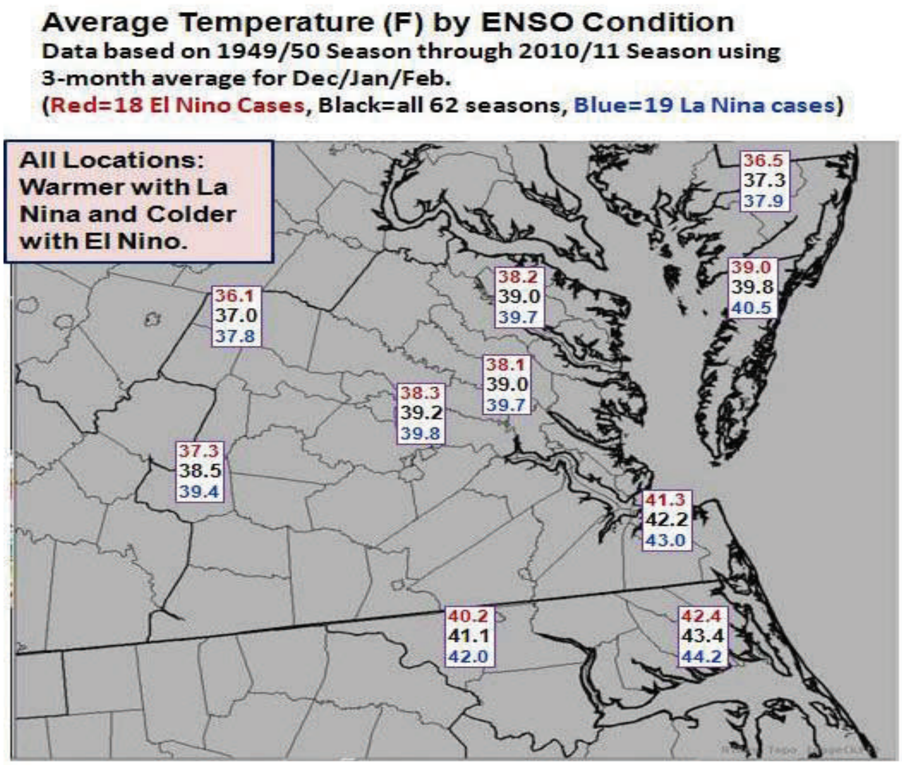
Snowfall climatology varies quite a bit across the Wakefield CWA, with the highest amounts typically across the northwest zones (Louisa) and much lower amounts over southeast VA and northeast NC. The red and blue shading on the map shows what ENSO condition produces greater snowfall (on average); roughly the northwest 2/3 of the CWA receives more snow on average during El Nino winters while southeast VA and northeast NC average more during La Nina winters.



The image to the left is similar to the previous slide except now compared against the phase of the NAO that dominated over a given winter season. At each site, the top number (orange) represents the average snowfall during a winter where a +NAO winter was dominant while the bottom number is the value for a –NAO winter. From the CPC data averaged over a 3-month period (DJF) we have identified 18 seasons since 1949/50 where the NAO was significantly positive and 17 that were significantly negative. The black number in the middle represents the average snowfall for all seasons (62) since 1949/50.

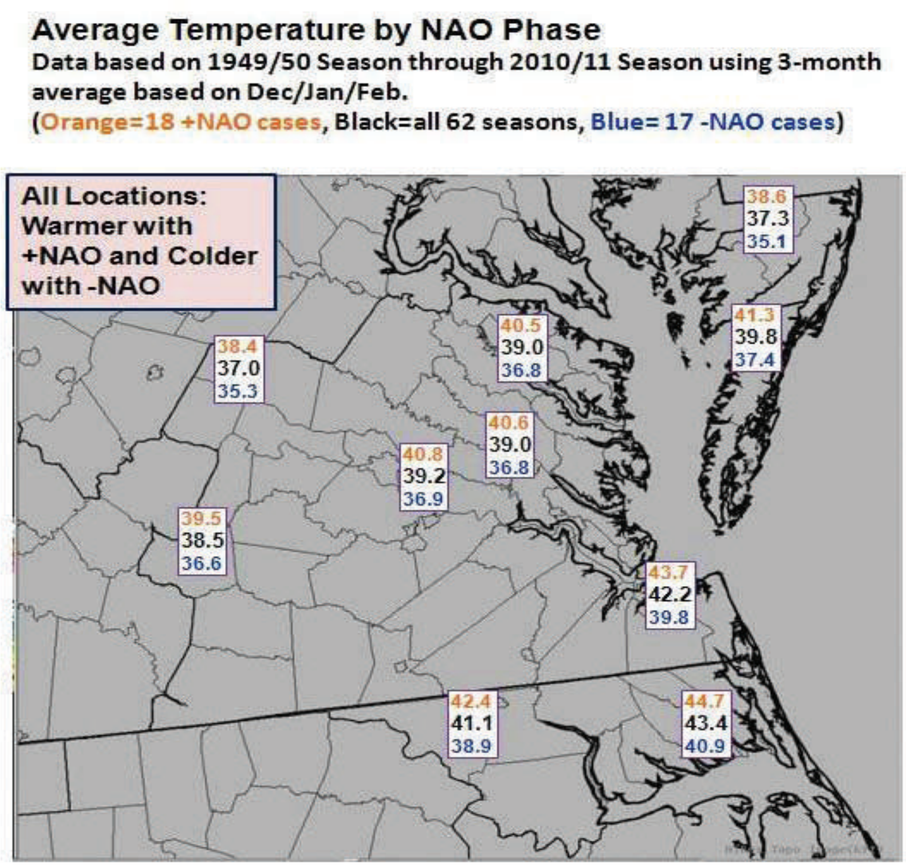
The entire CWA shows blue shading, indicating that all sites receive more snowfall (on average) during winters where a –NAO dominated. It is also important to note that the magnitude of the difference in snowfall averages at a given site tends to be greater across different phases of the NAO than that produced by different phases of ENSO, suggesting the NAO has a greater influence on snowfall than does ENSO across the Wakefield CWA.

Winter Climatology and 2011-2012 Preliminary Outlook (cont.)



The image to the left is similar to the previous slides except now represents the 3-month average temperature (DJF) at each site compared over the ENSO state. As before, the top value (red) is the value during El Nino winters (18 cases) while the bottom value (blue) is the DJF average temperature for La Nina winters. The black number in the middle is the DJF average temperature over all seasons since 1949/50.

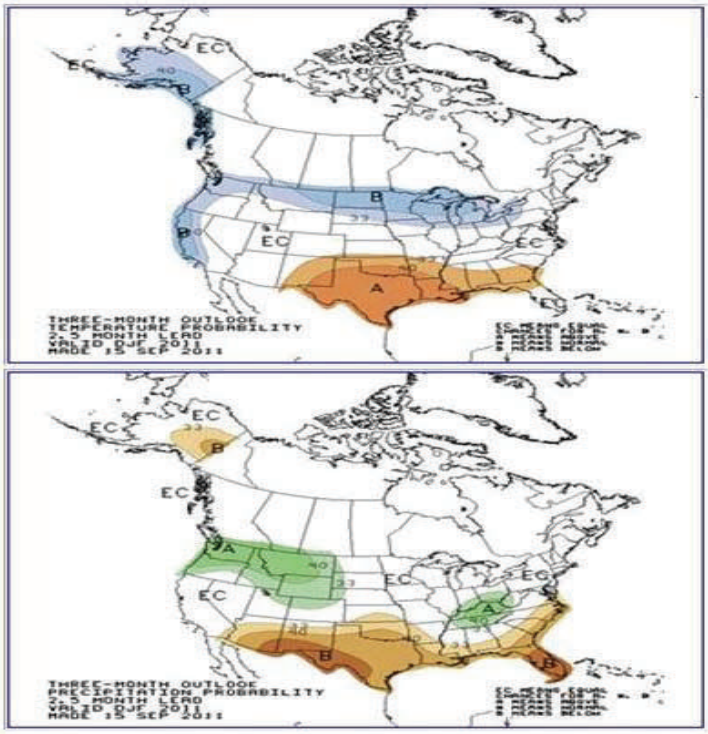
While all sites within the CWA experience colder average temperatures during winters where an El Nino was present (and warmer average temperatures when a La Nina occurred), the magnitude of the difference was less than 1 F in all cases.



The image to the left is similar to the previous slides except now for the 3-month average temperature (DJF) compared against the phase of the NAO that dominated over a given winter season. At each site, the top number (orange) represents the average temperature during a winter where a +NAO winter was dominant while the bottom number is the value for a –NAO winter. The black number in the middle represents the average temperature (DJF) for all seasons (62) since 1949/50.

The entire CWA experiences colder average temperatures during winters where a –NAO dominated (and warmer average temperatures when a +NAO winter is dominant). As with snowfall, it is important to note that the magnitude of the difference at a given site tends to be greater across different phases of the NAO than that produced by different phases of ENSO, suggesting the NAO has a greater influence on temperature than does ENSO across the Wakefield CWA. The –NAO in particular is impressive, generally leading to average temperatures of more than 2 F colder than the long term means.

Winter Climatology and 2011-2012 Preliminary Outlook (cont.)



Source: Climate Prediction Center

Summary and Conclusions:

As stated earlier, the Official NOAA Winter Outlook has not yet been issued by the Climate Prediction Center (CPC), but the images to the left are the temperature and precipitation forecast probabilities for the upcoming Dec/Jan/Feb 2011-12 season issued by CPC on a monthly basis. Note that the temperature forecast/outlook favors a La Nina signal with enhanced chances for colder than average temperatures over much of the northern tier of the US and higher chances for above average temperature across portions of the south central and deep SE states. Closer to home, over the mid Atlantic and Carolinas the temperature forecast shows "EC" or equal chances for either above, below, or near normal temperature. This is most likely due to the uncertainty with the NAO, which as this study has shown, tends to have more control over our temperature (and snowfall) than the more predictable ENSO signal. Over the far SE VA and ne NC zones there appears to be a slight enhancement to a drier than average winter (our local study did not address precipitation). As we get closer to winter the NAO will need to monitored closely to determine how the winter the begins.

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Thank You!
Hope you enjoyed this edition of
The Weather Nut!

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National Weather Service

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